

Cont. A²
integer of 6 to 8; m is an integer of 0 to 5 and s is an integer of 0 to 29, and a and t are an integer of 1 to 500.- -

REMARKS

The claims are 1, 2 and 4-7 with claim 1 the sole independent claim.

Former claim 3 has been cancelled without prejudice or disclaimer. The claims have been amended to resolve minor informalities and reconsideration of the claims is expressly requested.

The Examiner has objected to claims 1-5 under Rule 112, second paragraph, as being indefinite. Without necessarily admitting the propriety of the objection and solely to expedite prosecution the claims have been amended to resolve the informalities to which objection has been made. Withdrawal of the objection is respectfully requested.

The Examiner objected to claims 6 and 7 as being dependent from a multiple dependent claim (claim 5). That objection is respectfully traversed. Initially, it is submitted that a Preliminary Amendment dated October 13, 1999 (copy enclosed) was filed with the original application. In that paper, claims 6 and 7 were made dependent on claim 4. A return card stamped to show receipt of the original application and that Preliminary Amendment is enclosed. In any event, claim 5 has been amended so it is not multiply dependent. Therefore, it is submitted that claims 6 and 7 are in proper form. Applicants request that the objection to claims 6 and 7 be withdrawn and that the claims be examined on their merits.

Claims 1-4 were rejected as anticipated by WO '619. Claims 1-5 were rejected as anticipated by JP '836. Claim 5 was rejected as obvious over Green WO '619, in view of JP '504. The grounds of rejection are respectfully traversed.

Prior to addressing the grounds of rejection Applicants wish to briefly review certain key features and advantages of the present claimed invention. The present invention is a gel electrolyte which contains an ionically conductive material which is liquid at working temperature and a gelling agent which gels by forming a fibrous associated body via intermolecular bonding. As disclosed on instant specification page 3, lines 9-21 the gelling agent can form a fibrous associated body via intermolecular bonding, such as hydrogen bonding, and can form a gel which entraps an electrically conductive material which is liquid at working temperature. Individual gel agent compounds, through hydrogen bonding, associate to build up a fibrous gel.

The gelling agent need only be employed in relatively small amounts to be effective. For example, as disclosed on specification page 22 the typical amount of gelling agent employed is only from 0.1 to 20 parts based on 100 parts by weight of the liquid electrolyte. Accordingly, for each part of liquid electrolyte present, only 0.001 to 0.2 part of gelling agent typically need be present. The resulting gel electrolyte exhibits good electrical properties, since typically, a large ratio of electrolyte to gelling agent is present.

The gelling agent acts by forming a fibrous associated body from individual gel compounds which associate via intermolecular bonding such as hydrogen bonding, coordination bonding, or the like. The built-up matrix entraps liquid electrolyte. Clearly, the instant gelling agent is distinguished from a conventional polymer having covalent

bonds. A polymer is present in chain form and does not gel by intermolecular bonding of a gel compound to build up a fibrous matrix.

Green (WO '619) discloses a composite of a conventional polymer and a molten salt electrolyte immobilized within the polymer. Specific polymers used in WO '619 include polyethylene oxide, polyacrylonitrile and polymethylmethacrylate. See WO '619, page 1, lines 16-20 and page 2, lines 15-18. Polymers such as polyethylene oxide or polyacrylonitrile and the like are covalently bound polymers having defined repeating units. Such polymers do not form a gel by forming a fibrous associated body by building up fibers or chains of a compound which links via hydrogen bonding or other intermolecular bonds. The compounds in claim 5 link each other by intermolecular bonding to form a polymeric-type claim. To the contrary, a polymer is formed initially by covalently (intramolecularly) bonding monomeric repeating units or condensation units to form a molecule of polymer. The previously formed polymers then can entrap an electrolyte. Accordingly WO '619 fails to teach the instant gelling agent and, accordingly, does not anticipate the present claimed invention.

The defects of WO '619 are not remedied by GB '504. GB '504 also teaches use of a conventional preformed polymer, such as polyacrylamide, as the gelling agent. Such a polymer does not gel by forming a fibrous associated body from base compounds via intermolecular bonding.

JP '836 broadly discloses a gel electrolyte formed from a gelling agent and an electrolyte. However, the electrolyte can be a metal salt which is solid, not liquid, at room temperature, such as a metal iodide, a quaternary ammonium iodide, a metal bromide, a quaternary ammonium bromide and sulfur compounds. It is understood that

other useful electrolytes can include molten electrolytes which are liquid at room temperature. However, the gel electrolyte is not prepared by a gelling agent forming a fibrous associated body to entrap the liquid salts. Rather, the specification in JP '836 teaches the gel electrolyte is prepared by mixing the gelling agent, the electrolyte and a solvent. The mixture is heated to form a solution and then cooled. Further, the preferred electrolyte concentration is from 0.05 to 1.5 M. These amounts are far lower than the amounts typically employed in the present invention and would result in a less conductive product.

Finally, the present application claims priority benefits from a Japanese Application filed in October, 1998. JP '836 was published on July 9, 1999. Accordingly, if need be, Applicants can submit a sworn English translation of the Japanese priority application to show support therein and to remove JP '836 as a reference.

Accordingly, it is submitted that none of the references, whether considered alone or in combination, discloses or suggests the present claimed invention nor renders it unpatentable. Accordingly, it is respectfully requested that the claims be allowed and that the case be passed to issue.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

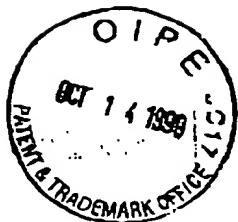
Respectfully submitted,



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Assistant Commissioner for Patents
Washington, D.C. 20231

Date 10 14 99
Mo Day Yr.
Atty. Docket 35C 13929

Sir:

Kindly acknowledge receipt of the accompanying.

- ☒ Specifications, claims and abstract 51 pages, with Transmittal Form
☒ Oath or Declaration and Power of Attorney ☐ Executed ☒ Not Executed
☒ 3 Sheets of ☒ formal ☐ informal drawings
☒ Check for \$ 1020.00 (filing fee)
☐ Small entity declaration
☐ Assignment, PTO-1595 and Check for \$ _____
☐ Transmittal Under 37 CFR 1.53(d) (CPA)
☐ Petition under 37 CFR 1.136 and check for \$ _____
☒ Other (specify) UTILITY Application -transmittal
Amendment
by placing your receiving date stamp hereon and mailing or returning to deliverer.
This is a ☐ Continuation ☐ Divisional ☐ Continuation-In-Part

Atty. LAB/r

Due Date 10 19 99
Mo Day Yr.

37 CFR 1.8 ☐
37 CFR 1.10 ☐
By Hand ☒

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| In re Application of: |) | |
| | : | Examiner: Unassigned |
| TOMONARI HORIKIRI, ET AL. |) | |
| | : | Group Art Unit: Unassigned |
| Application No.: Not yet |) | |
| | : | |
| assigned |) | |
| | : | |
| Filed: Herewith |) | |
| | : | |
| For: GEL ELECTROLYTE, CELL |) | |
| AND ELECTROCHROMIC | : | |
| ELEMENT |) | October 13, 1999 |

Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Contemporaneous with the filing of the subject
application, please amend the claims as follows:

Claim 6, line 3, change "5" to --4--.

Claim 7, line 6, change "5" to --4--.

REMARKS

Claims 6 and 7 have been amended to correct
informalities therein regarding multiple dependency.

Applicants' undersigned attorney may be reached in
our New York office by telephone at (212) 218-2100. All

correspondence should continue to be directed to our below
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Respectfully submitted,

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Appendix

Application No. 09/417,832

Docket No.: 03500.013929

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

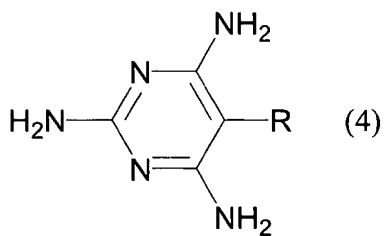
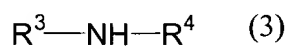
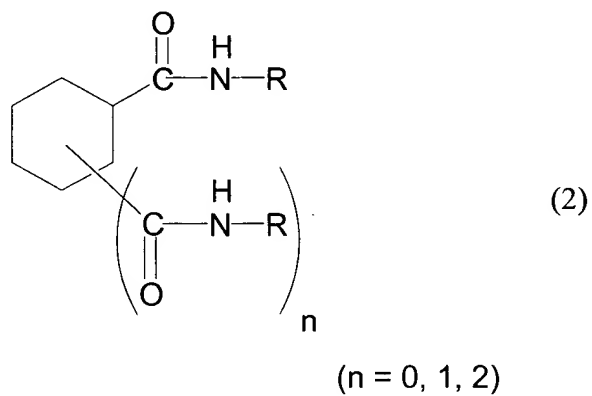
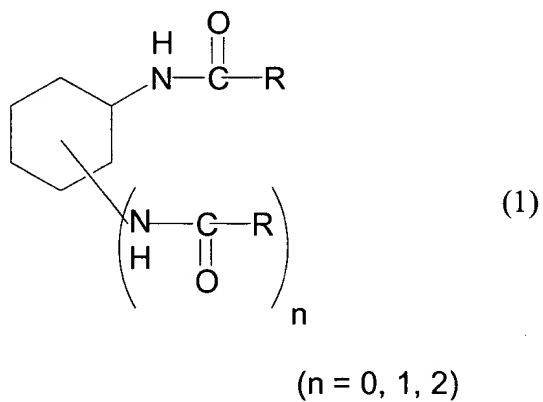
--1. (Amended) A gel electrolyte containing at least a gelling agent and [a] an ionically conductive material [of high ion conductivity being] which is liquid at working temperature, wherein said gelling agent gels by forming a fibrous associated body via intermolecular bonding.

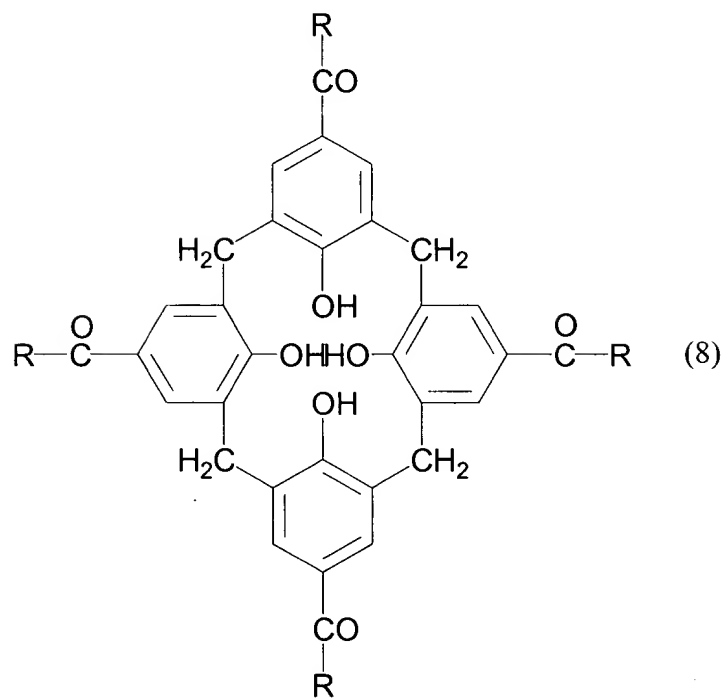
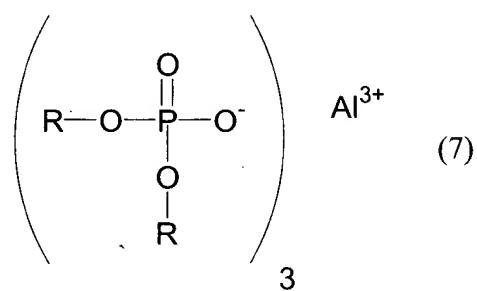
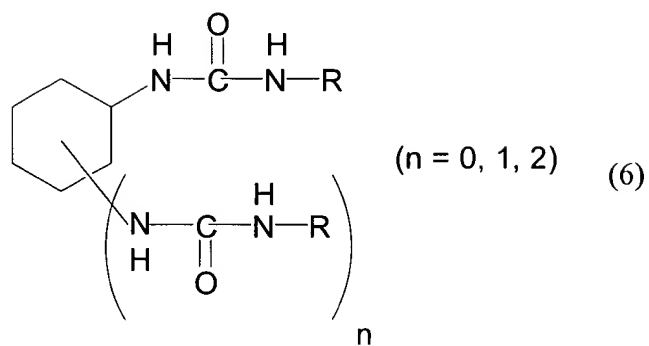
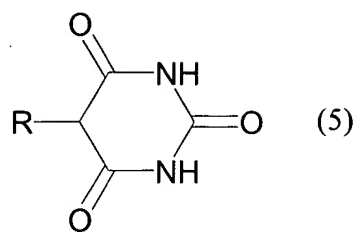
2. (Amended) The gel electrolyte of claim 1, wherein said ionically conductive material [of high ion conductivity] is a salt [being] which is liquid at room temperature.

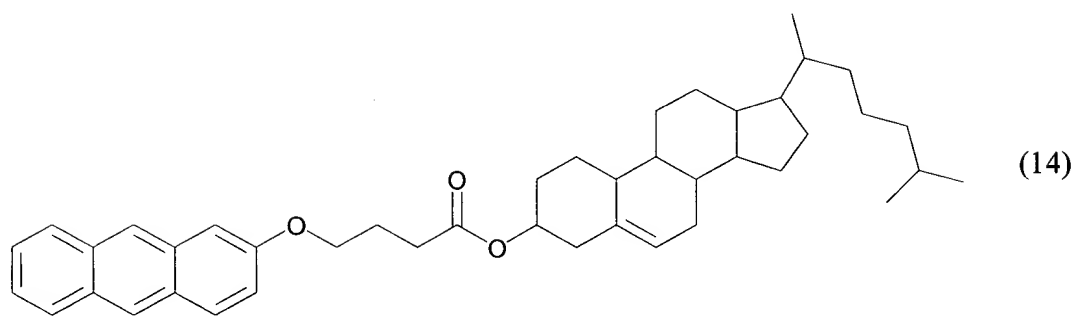
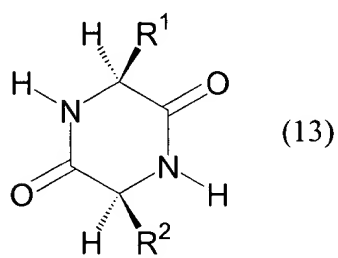
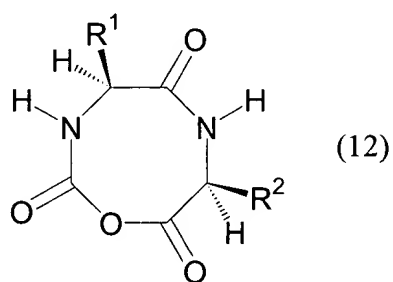
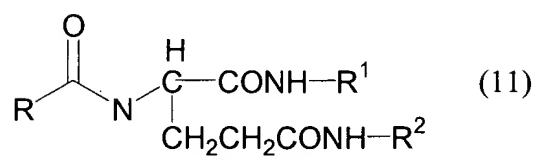
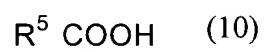
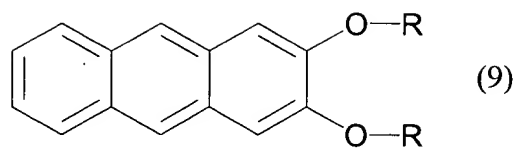
3. (Cancelled)

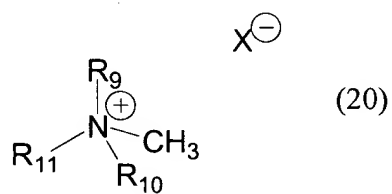
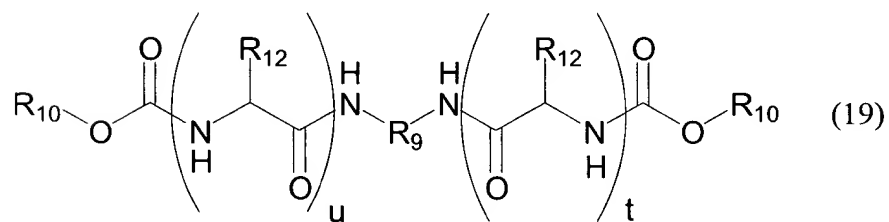
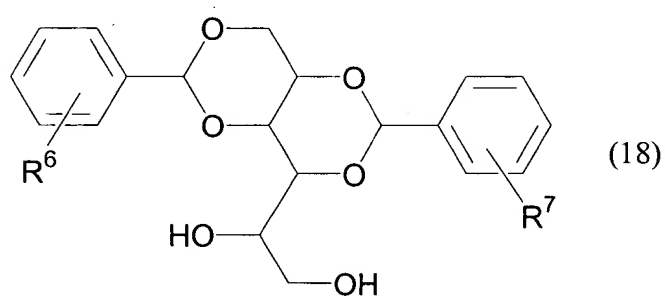
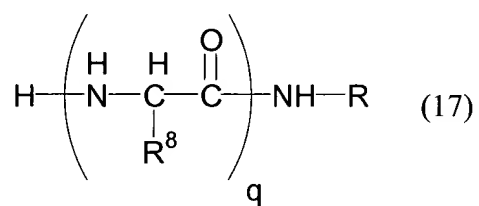
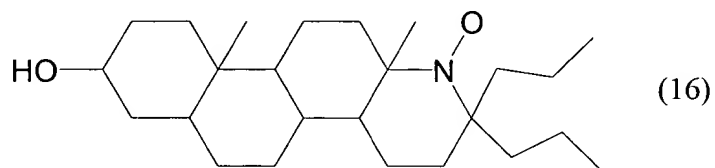
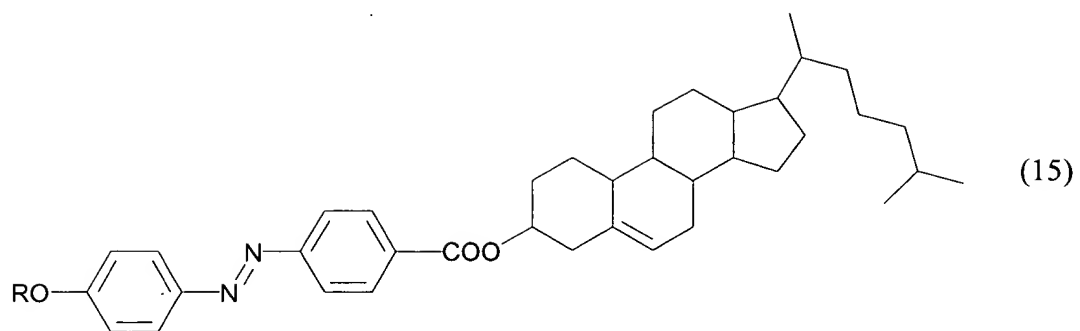
4. (Amended) The gel electrolyte of claim [3] 1, wherein said [self-assembling compound] gelling agent has at least one group[, as the substituent showing capability of hydrogen bonding,] selected from the group consisting of carbamate, amide, urea, carboxyl, alkoxy, hydroxyl, phosphate, amino and ammonium [groups].

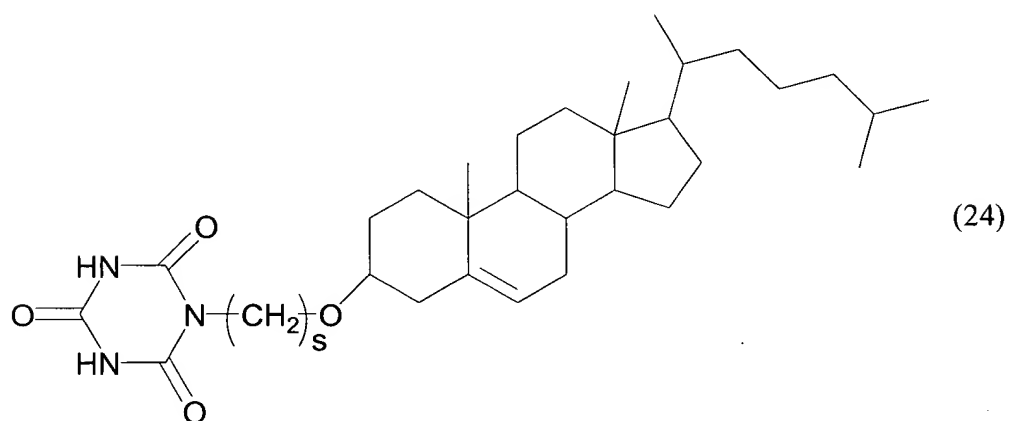
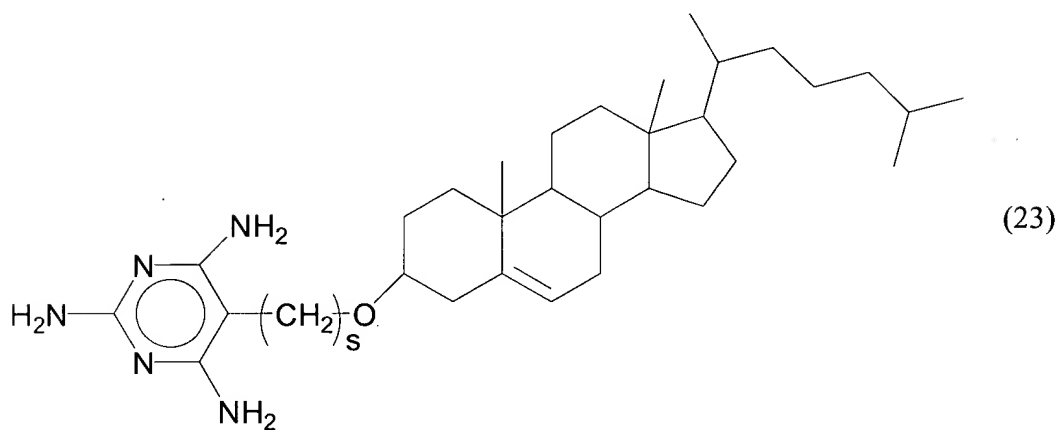
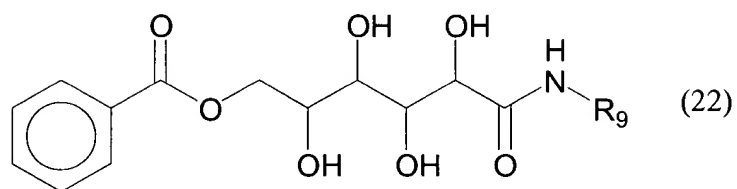
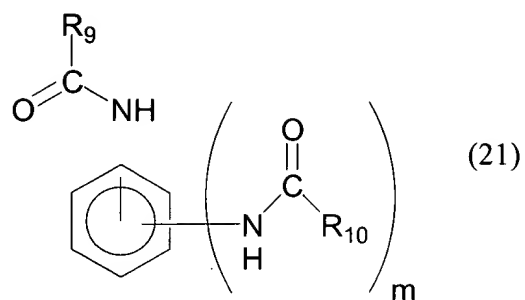
5. (Amended) The gel electrolyte of claim [3 or 4] 1, wherein said gelling agent [self-assembling compound] is selected from the group consisting of the compounds represented by the following formulae (1) to (26)[.] :

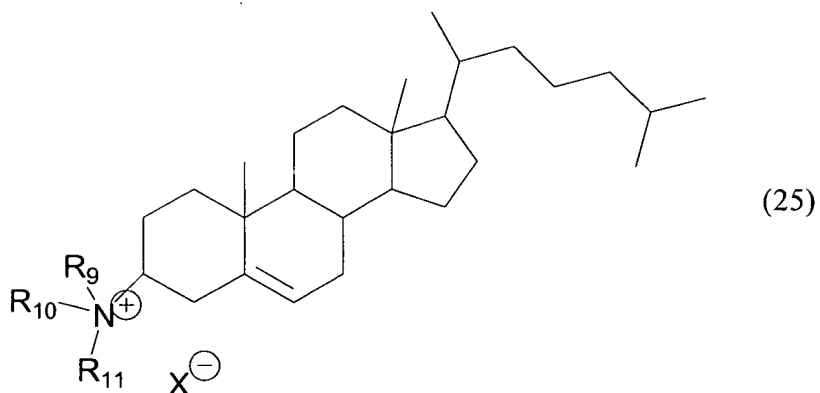




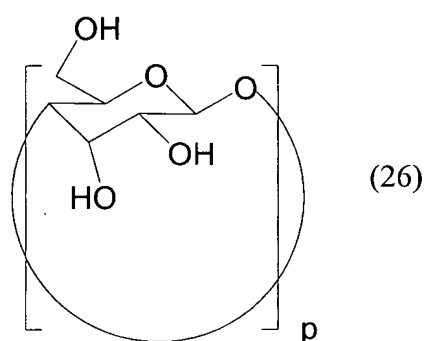








and



wherein, R , R_1 and R_2 are each hydrogen, or a straight-chain or branched aliphatic hydrocarbon group having a carbon number of 1 to 29; R_3 is an amino acid monomer or dimer with a protected amino group; R_4 is an aliphatic hydrocarbon having a carbon number of 1 to 29 or an aryl group; R_5 is a straight-chain aliphatic group having a carbon number of 1 to 29 and being substituted with one hydroxyl group; R_6 and R_7 , are each an aliphatic hydrocarbon group having a carbon number of 1 to 29 or an aryl group; R_8 is hydrogen, or an aliphatic hydrocarbon group having a carbon number of 1 to 5 or aryl group; n is 0, 1 or 2; q is an integer of 2 to 20; R_9 , R_{10} and R_{11} are each hydrogen, or

a straight-chain or branched aliphatic hydrocarbon group having a carbon number of 1 to 29; R_{12} is a side chain of an amino acid, or an alkyl or aryl group; X is a halogen; p is an integer of 6 to 8; m is an integer of 0 to 5 and s is an integer of 0 to 29, and a and t are an integer of 1 to 500.

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